

INCREASING AN ELECTRICAL RESISTANCE OF A RESISTOR BY OXIDATION OR NITRIDIZATION

Abstract of the Disclosure

A method and structure for increasing an electrical resistance of a resistor that is within a semiconductor structure, by oxidizing or nitridizing a fraction of a surface layer of the resistor with oxygen/nitrogen (i.e., oxygen or nitrogen) particles, respectively. The semiconductor structure may include a semiconductor wafer, a semiconductor chip, and an integrated circuit. The method and structure comprises five embodiments. The first embodiment comprises heating an interior of a heating chamber that includes the oxygen/nitrogen particles as gaseous oxygen/nitrogen-comprising molecules (e.g., molecular oxygen/nitrogen). The second embodiment comprises heating the fraction of the surface layer by a beam of radiation (e.g., laser radiation), or a beam of particles, such that the semiconductor structure is within a chamber that includes the oxygen/particles as gaseous oxygen/nitrogen-comprising molecules (e.g., molecular oxygen/nitrogen). The third embodiment comprises: using a plasma chamber to generate plasma oxygen/nitrogen ions; and applying a DC voltage to the plasma oxygen/nitrogen ions to accelerate the plasma oxygen/nitrogen ions into the resistor such that the oxygen/nitrogen particles include the plasma oxygen/nitrogen ions. The fourth embodiment comprises using an anodization circuit to electrolytically generate oxygen/nitrogen ions in an electrolytic solution in which the resistor is immersed, wherein the oxygen/nitrogen particles include the electrolytically-generated oxygen/nitrogen ions. The fifth embodiment comprises immersing the semiconductor structure in a chemical solution which includes the oxygen/nitrogen particles, wherein the oxygen/nitrogen particles may include oxygen/nitrogen-comprising liquid molecules, oxygen/nitrogen ions, or an oxygen/nitrogen-comprising gas dissolved in the chemical solution under pressurization.